SECTION 0.1 ENVIRONMENTAL HEALTH
(WAC 463-42-352)

0.1.1 NOISE

0.1.1.1 Summary

Dames & Moore conducted a noise impact analysis to assess the operational and construction noise impacts at the proposed pump stations and the Kittitas Terminal. Construction noise impacts and mitigation are further discussed in sections 4.1.1.7 and 4.1.1.8. All proposed equipment at the pump stations and the Kittitas Terminal are operated electrically minimizing noise impacts. The existing background noise environment was examined at the Kittitas Terminal and the pump stations along the pipeline route. The existing noise environment exceeds state and local noise ordinances at 2 locations. The sound levels in the Kittitas area are attributed to the proximity of Interstate 90 to the nearby receptors. Noise impacts from the Kittitas Terminal are predicted to be insignificant at most monitored locations, as well as for most of the pump stations examined. Mitigation measures employed by Olympic Pipe Line Company (OPL) will reduce the noise impacts associated with the Kittitas Terminal (see subsection 4.1.1.8). Three pump stations, Thrasher, North Bend, and Stampede, will be enclosed to reduce noise impacts on nearby receptors.

0.1.1.2 Characteristics of Noise Propagation and Attenuation

Ambient noise can be generated by a number of sources, including mobile sources, such as automobiles, trucks, trains, and airplanes, and stationary sources, such as construction sites, machinery, or industrial operations. "Background" noise sources often contribute substantially to ambient noise levels; background noise sources can include animal sounds, an occasional vehicle pass-by, a television or radio, or leaves rustling in the wind. These background sources can determine the ambient noise in areas not dominated by a single human-made major noise source.

Noise is any sound that is undesirable because it interferes with speech and hearing, or is otherwise annoying (unwanted sound). High-intensity loud sounds have the potential to cause hearing damage. Sound is measured in decibels (dB), a logarithmic ratio between pressures caused by a given sound and a standard sound pressure. Human hearing is not equally sensitive to all frequencies in the sound spectrum. Thus, the measurement of sound is intended to represent sound levels using a scale corresponding to the range and characteristics most consistent with the way humans perceive sounds--the A-weighted scale. In this report, dB represents the A-weighted decibel level (dBA). Because this scale is logarithmic, a dB increase does not result in a linear increase in loudness. In fact, small dB fluctuations (of less than 3 dB) are not audible.

Using the A-weighted scale, sound levels at an average residence typically range from 45 dB to 55 dB.

Sounds associated with freeway and highway traffic are generally louder, ranging from 65 dB to 80 dB, depending on the type, number, and speeds of vehicles on the roadway, distance from noise sensitive receptors to the noise source (traffic), and topographic conditions (attenuation affects). Because traffic sounds do vary, as do construction sounds, the average sound level, or L_{eq}, is used to represent the acoustical energy equivalent of the fluctuating sound.

Noise generated by point sources decrease by 6 dB per doubling of distance from the source. This is referred to as noise attenuation. Thus a noise level of 65 dBA, 50 feet from the source would be reduced to 59 dBA at 100 feet from the source. The amount of attenuation attributed to a given area also depends on the terrain between the noise source and receiver and, to a lesser extent, the moisture content of the atmosphere.

Noise levels at a given ground level location can usually be reduced by placing barriers between the noise source and receiver. In general, a structure acts as an effective noise barrier only when the structure breaks the line (or line-of-sight) between the noise source and receiver. Buildings, walls, and intervening topography can all act as noise barriers in various situations. Noise generated by traffic sounds can be reduced substantially when the line-of-sight between the noise source and receptor is interrupted by some sort of barrier with adequate mass to prevent noise transmission.

0.1.1.3 Regulatory Review

The state of Washington has established noise regulations based on land use compatibility. These regulations, codified in WAC 173-060, are summarized in Table 4.1-1. County and local municipalities without noise ordinances are regulated under state regulations. The potential noise sources associated with the pipeline are listed in Table 4.1-2, including land use and zoning district of the noise source, and nearest receptors. Please refer to the zoning maps for the pipeline project in Appendix A.

Ambient noise at the Thrasher Pump station is regulated by Snohomish County Code Chapter 10.01, Noise Control. The Snohomish County Noise Code is similar to WAC 173-060 as summarized in Table 4.1-1. Enforcement of the Code for industrial sources is provided by the State.

Ambient noise for the North Bend Station is regulated by the King County Department of Public Health noise ordinance (Chapter 12.86-12.99). Maximum permissible sound levels are established in 12.88.020. These standards are equivalent to WAC 173-060, with one additional land use category: rural. This category is included in Table 4.1-1.

TABLE 4.1-1
MAXIMUM PERMISSIBLE ENVIRONMENTAL NOISE LEVELS (dBA)
ECOLOGY AND KING/SNOHOMISH COUNTY COMBINED

EDNA[(a)] of Noise Source	EDNA of Receiving Property[(b)] Day (7 a.m. - 10 p.m.)			
	Rural	Class A Residential	Class B Commercial	Class C Industrial
Rural	49	52	55	57
Class A Residential	52	55	57	60
Class B Commercial	55	57	60	65
Class C Industrial	57	60	65	70

(a) EDNA = Environmental designation for noise abatement.

(b) Class A = **Residential areas** of lands where human beings reside and sleep; such as residential areas, multiple family living areas, recreational and entertainment areas (campgrounds, parks, resorts), community service areas (retirement homes, hospitals, health and correctional facilities).

Class B = **Commercial areas** or land uses requiring protection against noise interference with speech; such as commercial living and dining areas, motor vehicle services, retail services, banks, office buildings, and recreational areas not used for habitation (theaters, stadiums, fairgrounds, amusement parks).

Class C = **Industrial areas** or lands involving economic activities; such as agricultural, storage, warehouse, production, and distribution facilities.

Rural = **Rural areas** with King County zoning districts designated as A, F-r, F-P, S-E, G, and S-R greater than 35,000 square feet.

Maximum permissible levels during normal sleeping hours (10:00 p.m. to 7:00 a.m.) are further reduced by 10 dBA at Class A EDNA's.

When noise impacts are of limited duration, the values of Table 4.1-1 may be increased as follows:

- 5 dBA for a total of 15 minutes in any one-hour period,
- 10 dBA for a total of 5 minutes in any one-hour period, and
- 15 dBA for a total of 1.5 minutes in any one-hour period.

If noise levels exceed these criteria, noise abatement measures must be considered unless the source is specifically exempt from these regulations (construction noise, airport, vehicular noise, watercraft, and noise generated from safety warning devices).

Ecology, Snohomish County and King County allow an exemption for construction noises during the day, allowing for noise standards to be exceeded for a short duration.

Local noise ordinances exist within the cities and towns along the pipeline route. However, the jurisdiction of the local municipalities with regard to the pump station locations is limited to the locally zoned land-uses. For each of the pump stations and the Kittitas Terminal the monitoring sites and the noise sources are located in either the state or county land use zone, and are therefore subject to state or county noise codes. Local noise ordinances are typically enforced by the local police and deal mainly with nuisance-type noises.

TABLE 4.1-2
ZONING DESIGNATION AND EDNA CLASSIFICATIONS
OF EACH PIPELINE FACILITY

Facility	Zoning Designation/Land Use Description				
	Facility Designation	EDNA Class	Receptor Designation	EDNA Class	
Thrasher Station	Snohomish County - Suburban Agriculture	A	Snohomish County - Suburban Agriculture	A	55
North Bend Station	King County - Rural Residential	Rural	King County - Rural Residential King County - Regional Business	Rural B	55 55
Stampede Station	Kittitas County - Commercial Forest	B	Kittitas County - Commercial Forest	B	60
Kittitas Terminal	Kittitas County - existing: Agriculture annexation: City of Kittitas - Highway Commercial proposed: Light Industrial	C B C	Kittitas County - Agriculture 20 City of Kittitas - Highway Commercial	C B	70 70
Beverly-Burke Station	Grant County - Agriculture	C	Grant County - Open Space Recreation Grant County - Agriculture	B	65
Othello Pump Station	Adams County - Agriculture	C	Adams County - Agriculture	C	70

Note: All zoning and land use categories are discussed in detail in Section 5.1 - Land and Shoreline Use.

0.1.1.4 Kittitas Terminal Noise Assessment

The existing land use zone at the Kittitas Terminal is Agricultural (Ag-20). However, the City of Kittitas

has designated the land as industrial in its Comprehensive Plan. Kittitas County is in the process of amending its Zoning Code to add definitions for utilities, including pipeline, and the zones in which the utilities are permitted. OPL has requested that Kittitas County rezone the site as general industrial. Both agricultural and industrial zoning would be considered as a Class C EDNA. The resulting impacts under each of the three zones are presented within the text below

The primary noise impacts of the proposed Kittitas Terminal are expected to be short-term impacts associated with construction; longer-term impacts will be created by noise from the truck loading rack and the associated pumping activities at the terminal. Monitoring locations were selected to provide a representative sample of the existing noise levels in the area potentially affected by changes in the noise environment.

Existing Noise Environment

Noise monitoring was conducted at the proposed Kittitas Terminal and at other monitoring locations on September 12 and 13, 1995. Noise data were recorded every fifteen seconds for one 15-minute period at each site. Monitoring was conducted at each location during the following time periods: early morning (4:00 a.m.), morning (9:00 a.m.), day (12:00 p.m.), early evening (6:00 p.m.), and late evening (11:00 p.m.).

An Extech 407735 Type II sound level meter was used to perform the noise measurements. Prior to each measurement the meter was calibrated with an internal calibrator. The meter was also factory calibrated prior to initial use. The meter was set on an A-weighted scale with slow response time. The monitor was held approximately five feet above ground, with the meter facing toward the proposed noise source. Noise monitoring was conducted during periods without any type of precipitation and with a slight breeze. A wind screen was employed on the microphone to minimize noises generated by the breeze. Background noise sources, weather conditions, traffic, and other observations were recorded during the sampling period. Figure 4.1-1 presents the locations sampled.

FIGURE 4.1-1 NOISE MONITORING SITES

Site 1

Badger Pocket Road (south of I-90), Route 2, Box 1235. A residence is located approximately 500 feet east of the monitoring location. Monitoring was performed facing north toward the proposed facility and I-90. This area is primarily cropland with agriculture equipment and traffic noise dominating.

Site 2

Southwest corner of proposed terminal boundary. This site is located opposite the Texaco station and truck stop, north of I-90. Monitoring was performed facing the proposed facility (to the east). Traffic noise associated with I-90 and Badger Pocket Road predominates.

Site 3

Texaco station on Badger Pocket Road. This site is located west of the terminal site. Monitoring was performed at the entrance to the station due to the number of trucks idling throughout the property. Traffic noise from I-90 contributes to the sound levels recorded at this site. However, noise generated during the sampling periods was influenced by the truck idling on the property. The parking lot serves as a truck stop and overnight layover for truckers. This gas station is also heavily utilized by other vehicles throughout the day and night.

Site 4

Corner of Badger Pocket Road and private road. This site is located approximately 1,900 feet northwest of the proposed facility. This is the nearest residence to the terminal located on the north side of I-90. Traffic volumes are lighter than at the previous three sites as local traffic dominates Badger Pocket Road into downtown Kittitas. This site is considered the background site with no local noise influences. There is adjoining cropland to the east and southwest. North of this site is a dense residential area.

Site 5

Hemingston Road. This site is located at the end of Hemingston Road. There is a group of residences surrounded by cropland. Agricultural equipment contribute to noise levels recorded at this site. However, this site is located within 800 feet of I-90, which consistently dominates noise levels. This site is located approximately one-half mile east of the proposed facility.

Figure 4.1-2 illustrates the corresponding noise levels at each site.

FIGURE 4.1-2 - EXISTING NOISE LEVELS, KITTITAS, WASHINGTON

The Kittitas Terminal site would be classified as a Class C EDNA under both the existing Agricultural zoning and under the proposed Light Industrial Zoning. If the site is annexed to the City of Kittitas and remains zoned as "Highway Commercial", the EDNA classification would be Class B. Table 4.1-3 shows the comparison of the existing sound levels to the criteria for both Class B and Class C EDNA classifications.

Agricultural and Industrial Zoning

Existing noise levels recorded at Site 1 (Badger Pocket Road, south of facility) meet or exceed Ecology's noise abatement criteria for daytime hours (7:00 a.m. to 10:00 p.m.) as recorded during the morning and noon monitoring periods. Site 3 exceeds both day and night criteria (10:00 p.m. to 7 :00 a.m.). All other sites meet the permissible noise levels for all periods recorded.

TABLE 4.1-3
EXISTING AMBIENT NOISE LEVELS NEAR THE PROPOSED KITTITAS TERMINAL

Location	Site #	Agricultural and Light Industrial Criteria[(a)]		Highway Commercial Criteria[(a)]		Measured Sound Level L_{eq} (dBA)				
		Day	Night	Day	Night	Early a.m.	Morning	Noon	Early Evening	Late Evening
Badger Pocket Road- Class C EDNA (south of I-90)	1	70	70	65	65	51	65	66[(b)]	56	52
West Property Border- Class B EDNA	2	65	65	60	60	58	54	56	58	52
Texaco Station-Class B EDNA	3	65	65	60	60	66[(b)]	63[(b)]	55	63[(b)]	58
Badger Pocket Road (north of I-90)- Class B EDNA	4	65	65	60	60	53	56	57	52	49
Hemingston Road- Class C EDNA	5	70	70	65	65	60	58	61	54	61

(a) Nighttime noise limitations are reduced by 10 decibels during the hours of 10:00 p.m. to 7:00 a.m. for Class A receiving EDNAs.

(b) Exceeds noise criteria.

Impact Analysis

Operational impacts of the terminal facility are predicted based on the existing noise levels recorded at the sites and the estimated noise levels generated from the facility. Noise can be created by many source types at the facility including: increased traffic, and noise from the truck loading rack and associated noise from the pumps delivering product from the storage tanks to the loading rack. Increased traffic volumes are not likely to impact the area largely due to negligible increases in traffic resulting from the operation of the proposed facility. Operations from the loading rack may influence the existing noise environment at the nearby receptors and will be evaluated.

In order to define the impact which may occur the following criteria will be used to define the predicted impact on the receptor:

- Beneficial: Noise levels would permanently decrease from existing levels.
- Insignificant: Noise level increases are less than 3 dBA, Leq.
- Low: Noise levels may increase temporarily, or may permanently increase existing noise levels by less than 5 DBA, Leq.
- Moderate: Noise levels would permanently increase existing levels by 5-9 dBA Leq but would remain below applicable standards.
- High Noise levels would permanently increase existing levels by 10 dBA Leq or greater, or cause an exceedance above applicable standards.

Truck Loading Operational Impacts

The physical limitation of the loading rack is considered to be 2 trucks loading product simultaneously. Because the typical duration to fill a 10,000 gallon tank truck is approximately 20 minutes it is assumed that in any one hour, a maximum of six trucks will load product at the terminal. This is considered the worst-case scenario for the loading rack. In order to estimate the noise generated by the loading rack, noise monitoring was performed at an existing loading rack.

The loading rack at the TOSCO facility in Renton, Washington was monitored to collect data relating to noise levels generated by a loading rack. The TOSCO facility is similar to the proposed Kittitas facility considering the type of equipment, pollution control devices and size of the loading rack. The TOSCO facility has essentially the same number of product loading pumps associated with the loading rack and similar design as the proposed Kittitas facility. Monitoring was performed on August 28, 1996 during clear, warm weather conditions. The monitoring period continued for approximately 20 minutes coinciding with the complete loading cycle. During the cycle one truck loaded product generating an Leq of 80 DBA and a peak noise level of 81 dBA. The distance from the monitor to the center of the noise source was approximately 30 feet. No other noise sources were detected during the monitoring period.

The data collected at the TOSCO facility was used as the basis for estimating noise generated at the proposed facility in Kittitas. If one truck loading operation produced a peak noise of 81 dBA then two simultaneous loading operations are predicted to create 84 dBA 30 feet from the center of the noise source. The predicted noise levels at each receptor can be estimated by adding the existing noise levels at each receptor with the attenuated noise level generated by the loading rack. Table 4.1-4 presents noise levels predicted from the loading rack operations using noise criteria established for the existing agricultural and light industrial zoning (Class C EDNA). Table 4.1-5 presents the predicted noise levels due to the loading rack operations at the Kittitas Terminal using noise criteria established for highway commercial zoning (Class B EDNA).

The distance to the receptor assumes the noise is emitted from the center of the loading rack accessway. The predicted impacts are summarized in Table 4.1-4.

Truck loading operations are predicted to have impacts at Site 2 during the day and evening time periods. This receptor is the closest to the facility. There are no residential units at this receptor. Site 2 is located on the west border of the property next to Badger Pocket Road. Although noise produces high impacts at this receptor, impacts at Site 2 should be considered insignificant because of their measurement at the property boundary. Noise levels at Site 3 are heavily influenced by truck and vehicle traffic into the service station. Sounds from other sources are more likely to impact this receptor. Despite local influences impacts at Site 3 are considered high.

Ambient noise levels at Site 1, Badger Pocket Road (south) exceed the daytime standard, therefore

predicted noise increases at this receptor are insignificant. This receptor is a residential unit located adjacent to I-90 and nighttime noise levels are heavily influenced by vehicle noise as well. Due to the temporary nature of the truck loading operation, moderate impacts are predicted for this site during nighttime hours.

Existing Agricultural or Light Industrial Zoning Scenario

At sites 1, 4, and 5 existing and predicted noise levels meet the noise criteria for day and nighttime periods.

At site 2 the loading rack operations are predicted to increase existing noise levels by +9 dBA, and will exceed the noise criteria standard. Impacts at this location are predicted to be high. However, there are no significant receptors at this location.

At site 3 the existing noise levels currently meet or exceed the noise criteria. Noise levels at this location are predicted to be less than 3 dBA, therefore, impacts at this location are considered insignificant.

TABLE 4.1-4

PREDICTED NOISE LEVEL INCREASES DUE TO TRUCK LOADING OPERATIONS AT THE KITTITAS TERMINAL

EXISTING AGRICULTURAL OR PROPOSED INDUSTRIAL ZONING SCENARIO

Location	Site	Predicted Noise Level (dBA)- Day				Predicted Noise Level (dBA) - Night				Criteria	
		Measured	Estimated Noise Generated[(b)]	Predicted Total	Increase	Measured	Estimated Noise Generated[(b)]	Predicted Total	Increase	Day	Night
Badger Pocket Road (south)	1	66	48	66	0	52	48	54	+2	70	70
West border	2	58	66[(c)]	67[(c)]	+9	58	66[(c)]	67[(c)]	+9	65	65
Texaco	3	63	60	65	+2	66[(c)]	60	67[(c)]	+1	65	65
Badger Pocket Road (north)	4	57	48	58	+1	53	48	54	+1	65	65
Hemingston Road	5	61	42	61	0	61	42	61	0	70	70

(a) The maximum ambient hourly Leq was chosen for each corresponding day or night period.

(b) Estimated noise generated 84 dBA (measured at 30 feet from the source). Distance from the center of the driveway to the monitoring site was calculated and the total dBA was reduced by 6 dBA for every doubling of distance.

(c) Noise levels exceed applicable day/night standards.

Kittitas Pump Station Operational Impacts

Potential noise impacts may also be predicted from pump operations at the Kittitas Terminal. The methodology used to analyze the impacts of the noise generated from the pump station operations on nearby receptors is based on data collected from an existing pump station. The pump station located at Olympic Pipe Line's Renton, Washington facility was monitored for a 15 minute period on August 28, 1996. During the monitoring period 2 pump/motor units were operating simultaneously adjacent to one another. Product was being delivered into an existing pipeline by one 2500 horse-power unit and one 1250 horse-power unit. Monitoring was conducted approximately 15 feet from the end-line of the units. The sources were located approximately 15 feet apart, with the noise source about 5 feet above ground. The hourly Leq of the station operation was recorded at 80 dBA. The predicted noise levels for the Kittitas facility were calculated using a 6 dBA reduction per doubling of distance from the source using the recorded hourly Leq generated by the existing pump station in Renton.

Existing Agricultural or Proposed Industrial Zoning Scenario

Table 4.1-5 presents the predicted estimated noise levels at the monitored locations for the facility located within either an agricultural or a industrial zoning designation. At all locations, except site 3, pump station operations are not predicted to impact noise levels during day or nighttime periods. At site 3 the nighttime noise criteria is currently exceeded and impacts from the proposed facility are predicted to be insignificant.

Cumulative Impacts at the Kittitas Terminal

If the loading rack and the pump station operated simultaneously a cumulative noise level would be generated. The pump stations will operate 24-hours per day, while the loading rack may operate intermittently throughout the same period. Therefore, a worst-case scenario was used to predict the cumulative noise impact of both noises on nearby receptors.

Existing Agricultural or Proposed Industrial Zoning Scenario

Table 4.1-6 presents the cumulative impacts for the terminal under either the existing agricultural or proposed industrial zoning. Because the pump station will operate continuously, the base noise level at each receptor was considered to be the predicted noise levels shown on Table 4.1-5. The estimated noise generated by the loading rack at each receptor is the same generated noise level as stated in Table 4.1-4. At sites 1, 4, and 5 the predicted impacts at the monitored locations will be insignificant and the noise criteria will be met. At site 2 the estimated noise generated from the loading rack operations will impact upon the baseline noise level (existing noise levels in combination with pump station operations) and increase the noise levels by +8 DBA. The day and night noise criteria is predicted to be exceeded and impacts are considered high at site 2. However, there are no significant receptors at this location. Site 3, the monitored location nearest to site 2, the noise levels are predicted to meet or exceed the noise criteria. During the

nighttime hours, the measured noise level at this location exceeds the noise criteria. Because the predicted cumulative noise levels are predicted to increase less than 3 dBA for the corresponding periods, impacts are considered insignificant.

Summary of Impacts at the Kittitas Terminal

The impact of the pump station at the proposed terminal on each of the monitored locations is considered insignificant for each of the zoning designations assessed. The cumulative impacts of the facility caused by the additional noises generated by the loading rack operations significantly increases noise levels at site 2 for all zoning scenarios. Exceedances of the standards are predicted during day and night operations. However, there are no significant receptors at this location. The nearest receptors are located within equivalent distances both west and north of site 2; the Texaco station (site 3), and the BP station, respectively. At site 3, and at each of the remaining monitored locations no impacts to existing noise levels are predicted.

TABLE 4.1-5

PREDICTED NOISE LEVEL INCREASES DUE TO PUMP STATION OPERATIONS AT THE KITTITAS TERMINAL EXISTING AGRICULTURAL OR PROPOSED INDUSTRIAL ZONING SCENARIO

Location	Site	Predicted Noise Level (dBA)- Day				Predicted Noise Level (dBA) - Night				Criteria	
		Measured(a)	Estimated Noise Generated[(b)]	Predicted Total	Increase	Measured[(a)]	Estimated Noise Generated[(b)]	Predicted Total	Increase	Day	Night
Badger Pocket Road (south)	1	66	38	66	0	52	38	52	0	70	70
West border	2	58	50	59	+1	58	50	59	+1	65	65
Texaco	3	63	50	63	0	66[(c)]	50	66[(c)]	0	65	65
Badger Pocket Road (north)	4	57	38	57	0	53	38	53	0	65	65
Hemingston Road	5	61	38	61	0	61	38	61	0	70	70

(a) The maximum ambient hourly Leq was chosen for each corresponding day or night period.

(b) Predicted noise generated is based on data collected at a similar facility producing a total 80 dBA (measured at 15 feet from the source). Distance from the center of the pump house to the monitoring site was calculated and the total dBA was reduced by 6 dBA for every doubling of distance.

(c) Noise levels exceed applicable day/night standards.

TABLE 4.1-6
PREDICTED CUMULATIVE NOISE LEVELS AT THE KITTITAS FACILITY
EXISTING AGRICULTURAL OR PROPOSED INDUSTRIAL ZONING SCENARIO

Location	Site	Predicted Noise Level (dBA)- Day				Predicted Noise Level (dBA) - Night				Criteria	
		Existing Noise Level Combined w/Pump Noise[a]	Estimated Noise Generated From the Loading Rack[b]	Predicted Cumulative Total	Increase	Existing Noise Level Combined w/Pump Noise[a]	Estimated Noise Generated From the Loading Rack[b]	Predicted Cumulative Total	Increase	Day	Night
Badger Pocket Road (south)	1	66	40	66	0	52	48	54	+2	70	70
West border	2	59	66[c]	67[c]	+8	59	66[c]	67[c]	+8	65	65
Texaco	3	63	60	65	+2	66[c]	60	67[c]	+1	65	65
Badger Pocket Road (north)	4	57	48	49	0	53	48	54	+1	65	65
Hemingston Road	5	61	42	61	0	61	42	61	0	70	70

(a) The existing noise level recorded at the site combined with the predicted attenuated noise from the pump station are presented. See Table 4.1-6 Predicted Totals.
(b) Estimated noise generated from the loading rack is presented in Table 4.1-4 Estimated Noi se Generated.
(c) Noise levels exceed applicable day/night standards.

0.1.1.5 Impact Assessment of Pump Stations

Similarly to the Kittitas Terminal, the pump stations along the pipeline route may create impacts in their vicinities. Noise monitoring was performed at the proposed pump locations; Thrasher, North Bend, Stampede Beverly-Burke and Othello. The pump station located at the Kittitas Terminal has been discussed above and is therefore not included in this section.

For each pump station location receptors were chosen which would represent the nearest land-use types within the vicinity of the proposed pump station. Monitoring was conducted using the same methodology and equipment used at the Kittitas Terminal. Monitoring was conducted from August 22 through August 28, 1996 at the pump station locations. Existing noise levels were recorded and are represented by hourly Leq noise levels for each monitoring period. The predicted noise levels were estimated using the hourly Leq noise level recorded at the existing facility in Renton, Washington in combination with the monitored existing noise environment.

Olympic Pipe Line will enclose three pump stations for mitigation purposes or for pump protection from harsh environments. These enclosures will be located at Thrasher, North Bend, and Stampede. The enclosure will be constructed of 22-gauge steel, with wood panels and insulation. According to Owens' Corning guidance for sound transmission loss, this type of construction reduces noise transmission by 40 dBA. Thus, the maximum noise generated by the existing facility would be reduced by 40 dBA when enclosed with this building construction.

Thrasher Station

Four monitoring sites were selected within the vicinity of the Thrasher pump station to characterize the existing noise environment. Figure 4.1-3 shows each receptor location relative to the proposed pump station location. Each receptor and the proposed noise source are located within residential land-use zones and are considered class A EDNAs.

FIGURE 4.1-3 - THRASHER PUMP STATION NOISE MONITORING SITES

Site 1

North Property Border. Monitoring was conducted at the fenceline of the proposed property boundary. This site is a "soft" site characterized by vegetation and grassland. Monitoring was conducted facing south, into the property and away from Maltby Road. The predominant noise source is vehicular traffic from Maltby Road.

Site 2

4609 Maltby Road (north of pump station). The nearest residence is located opposite the proposed pump station at 4609 Maltby Road. Monitoring was conducted at the driveway entrance facing the proposed pump station and Maltby Road. The predominant noise source at this location is traffic-related.

Site 3

4708 Maltby Road (south of property). This receptor is located up the hill on the south side of the proposed property at the end of 46th Ave. Data was collected facing north down the hill toward to the proposed location. High-voltage utility lines were located above the receptor area. Dominant noise sources included distant traffic from Maltby Road, household activities, and crackling powerlines.

Site 4

4518 Maltby Road (west of property). Two houses share a common driveway off Maltby Road and are located adjacent to the proposed pump station toward the west. This location is characterized by trees and vegetation. Vehicular traffic from Maltby Road contributes significantly to the existing noise environment at this location.

Data was collected during four 15-minute monitoring periods to represent a 24-hour day. The periods were noon, 7 PM, 11 PM, and 8 AM. The 11 PM monitoring period represents the nighttime hours while the remainder characterize daytime hours. The existing noise levels recorded at the monitoring locations are presented in Figure 4.1-4 and Table 4.1-7.

FIGURE 4.1-4 - THRASHER PUMP STATION EXISTING NOISE LEVELS

Existing noise levels adjacent to the proposed facility exceed the daytime noise criteria at each of the monitored locations. Only site 3, located approximately 400 feet south of the proposed pump station meets the nighttime noise criteria for Class A EDNAs. However, existing noise levels at site 3 reach the maximum permissible noise criteria. At all four sites, traffic noise is the predominant noise generator.

Impacts from the pump station at each of the receptors are presented in Table 4.1-8. The pump station will be enclosed at this location to aid in the mitigation of noise generated at the site. The estimated noise generated from the enclosed pump house will not impact any of the receptors during the day or evening periods. Therefore, the noise impacts of the pump station at Thrasher are insignificant to the existing noise levels within the vicinity of the proposed pump station.

TABLE 4.1-7
EXISTING NOISE LEVELS NEAR THE PROPOSED THRASHER PUMP STATION

Location	Site #	Criteria[(a)]		Measured Sound Level L_{eq} (dBA)			
		Day	Night	8 AM	Noon	Early Evening	Late Evening
North Property Border Class A EDNA	1	55	45	62[(b)]	72[(b)]	66[(b)]	57[(b)]
4609 Maltby Road- Class A EDNA (north of facility)	2	55	45	68[(b)]	74[(b)]	72[(b)]	59[(b)]
4708 Maltby Road-Class A EDNA (south of facility)	3	55	45	51	60[(b)]	53	45
4518 Maltby Road-Class A EDNA (west of facility)	4	55	45	59[(b)]	62[(b)]	61[(b)]	55[(b)]

(a) Nighttime noise limitations are reduced by 10 decibels during the hours of 10:00 p.m. to 7:00 a.m. for Class A receiving EDNAs.

(b) Exceeds noise criteria.

TABLE 4.1-8
PREDICTED NOISE LEVEL INCREASES DUE TO PUMP STATION OPERATIONS AT THRASHER

Location	Site	Predicted Noise Level (dBA)- Day				Predicted Noise Level (dBA) - Night				Criteria	
		Measured [a]	Estimated Noise Generated[b]	Predicted Total	Increase	Measured[a]	Estimated Noise Generated[b]	Predicted Total	Increase	Day	Night
North Property Border	1	72[c]	40	72[c]	0	57[c]	40	57[c]	0	55	45
4609 Maltby Road (north)	2	74[c]	28	74[c]	0	59[c]	28	59[c]	0	55	45
4708 Maltby Road (south)	3	60[c]	6	60[c]	0	45	6	45	0	55	45
4518 Maltby Road (west)	4	62[c]	22	62[c]	0	55[c]	22	55[c]	0	55	45

(a) The maximum ambient hourly Leq was chosen for each corresponding day or night period.

(b) Estimated noise generated is based on data collected at a similar facility producing a total 80 dBA, with a 40 dB reduction in transmission loss due to building enclosure. Total dBA was calculated by reducing generated noise levels 6 dBA for every doubling of distance.

(c) Noise levels exceed applicable day/night standards.

North Bend

Monitoring was conducted at three sites within the vicinity of the proposed North Bend station. The proposed location is within King County and is therefore subject to the King County Noise Ordinance. The nearest residences were chosen as the receptor locations to be monitored. Data was collected during four time periods representing day and nighttime hours. All three sites are characterized by vegetative growth, a rural residential road, and residential activities. Figure 4.1-5 shows the location of each receptor relative to the proposed pump station location.

FIGURE 4.1-5 - PROPOSED NORTH BEND PUMP STATION NOISE MONITORING SITES

Site 1

Property on north side of Cedar Falls Trail, located along the pipeline right-of-way and the Cedar Falls recreation Trail. It is zoned as rural residential and is located approximately 150 feet from the proposed pump station building.

Site 2

North of Cedar Falls Trail. Data was collected at the original pump station site, north of the Cedar Falls Trail, at property border along Southeast 120th Street. The pump house will be located approximately 150 feet south. The nearest residence is located about 100 yards to the west from this site. Predominant noises were generated from distant construction activities, and rural sounds such as birds. Traffic did not contribute to the existing noise levels at this site. The current zoning is rural residential/urban reserve. For purposes of this application the more stringent rural receiving EDNA will be used.

Site 3

USFS Compound. The US Forest Service houses employees in a residential compound located on Southeast 120th Street. This site represents numerous residences located along this portion of 120th. The site is within the line-of-sight toward the proposed pump station location approximately 400 feet northeast. Distant traffic noise from North Bend Way contribute to the existing noise levels. Zoning for this receptor is King County regional business, or a Commercial Class B receiving EDNA.

Figure 4.1-6 displays the monitored noise levels recorded for each monitoring period. Table 4.1-9 presents the existing noise levels at each of the receptors. At each location the daytime criteria has not been exceeded. At site 2 the standard has been reached. During the nighttime hours sites 1 and 2 exceed the criteria set for rural residential areas after 10 PM through 7 AM.

Figure 4.1-6 North Bend Station Existing Noise Levels

Impacts from the pump station are predicted in Table 4.1-10. The enclosed pump station is not predicted to cause any increase in existing noise levels and is will not impact the existing noise levels.

TABLE 4.1-9
EXISTING NOISE LEVELS NEAR THE PROPOSED NORTH BEND PUMP STATION

Location	Site #	Criteria[a]		Measured Sound Level L_{eq} (dBA)			
		Day	Night	6 AM	Noon	Early Evening	Late Evening
South Property - Rural EDNA	1	49	39	43[b]	47	46	46[b]
North of Site -Rural EDNA	2	49	39	42[b]	49	42	46[b]
USFS Compound-Class B EDNA (south of facility)	3	55	55	46	49	45	45

(a) Nighttime noise limitations are reduced by 10 decibels during the hours of 10:00 p.m. to 7:00 a.m. for Class A receiving EDNAs.

(b) Exceeds noise criteria.

TABLE 4.1-10
PREDICTED NOISE LEVEL INCREASES DUE TO PUMP STATION OPERATIONS AT NORTH BEND

Location	Site	Predicted Noise Level (dBA)- Day				Predicted Noise Level (dBA) - Night				Criteria	
		Measured [a]	Estimated Noise Generated[b]	Predicted Total	Increase	Measured[a]	Estimated Noise Generated[b]	Predicted Total	Increase	Day	Night
South Property Border	1	47	22	47	0	46[c]	22	46[c]	0	55	45
North Property Border	2	49	28	49	0	46[c]	28	46[c]	0	55	45
USFS Compound (south)	3	49	6	49	0	46	6	46	0	55	45

(a) The maximum ambient hourly Leq was chosen for each corresponding day or night period.

(b) Estimated noise generated is based on data collected at a similar facility producing a total 80 dBA, with a 40 dB reduction in transmission loss due to building enclosure. Total dBA was calculated by reducing generated noise levels 6 dBA for every doubling of distance.

(c) Noise levels exceed applicable day/night standards.

Stampede Station

Noise monitoring was conducted at four locations within the vicinity of Stampede Station. The nearest residences are sparsely distributed in the area and are located at least 900 feet from the proposed location. However, the Iron Horse Trail does adjoin the proposed property location. An existing utility station is also located adjacent to the property. High-voltage utility lines exist above the Iron Horse Trail. The predominant noise sources in the vicinity of the proposed station are the utility lines and recreational activities along the trail. Intermittent vehicle traffic also contributes to the existing noise levels at each of the receptors. The land-use zone for each receptor and source location is commercial forest, Class B EDNAs. Figure 4.1-7 shows the locations of each monitoring location, and Figure 4.1-8 presents the existing noise levels. The pump station is proposed to be enclosed.

Figure 4.1-7 Stampede Pass Pump Station Noise Monitoring Sites

Figure 4.1-8 Stampede Pass Station Existing Noise Levels

Site 1

West property border. The proposed pump station location was monitored at Site 1. The site is characterized by heavy vegetation, recreational activities, and vehicular traffic along unpaved forest service roads. Monitoring was conducted toward the Iron Horse Trail away from the roadway. A small parking lot associated with the trail is located west of this monitoring site as well.

Site 2

USFS Road 5420. Approximately 1000 feet south of the proposed station USFS Road 5420 intersects Stampede Pass Road. There is no line-of-sight toward the pump station and is separated by dense forest. No residences are located within the receptor's vicinity. Some construction activities create noise and traffic during the early morning hours each weekday.

Site 3

USFS Road 5400. One private residence is located between the proposed pump station and USFS Road 5400. The monitoring location is approximately 1000 feet from the pump station while the residence is estimated at 900 feet north of the proposed station. Sparse residences are located westward from this monitoring location at much greater distances.

Site 4

Crystal Springs Campground. Data was collected at Crystal Springs Campground approximately 1 mile northeast of the pump station. Noise data was collected at this location in the event that nighttime recorded noise levels were very low and predicted noise levels generated by the pump station might contribute to the existing noise levels at this location. Based on the dominant traffic noise produced by nearby Interstate I-90, it is unlikely that noise generated by the pump station would impact this location.

Table 4.14-11 presents the existing noise levels as recorded at each location. As shown in Table 4.1-12 there are no impacts predicted for the pump station operations at the proposed Stampede Station. Exceedances of the maximum permissible noise levels were recorded for the Crystal Springs Campground due to the noise generated by I-90.

TABLE 4.1-11
EXISTING NOISE LEVELS NEAR THE PROPOSED STAMPEDE PUMP STATION

Location	Site #	Criteria[(a)]		Measured Sound Level L_{eq} (dBA)			
		Day	Night	6 AM	Noon	Early Evening	Late Evening
West Property Border - Class B EDNA	1	60	60	54	54	47	48
USFS Road 5420-Class B EDNA	2	60	60	54	49	50	44
USFS Road 5400- Class B EDNA	3	60	60	50	54	48	45
Crystal Springs Campground-Class B EDNA	4	60	60	59	--	66[(b)]	61[(b)]

(a) Nighttime noise limitations are reduced by 10 decibels during the hours of 10:00 p.m. to 7:00 a.m. for Class A receiving EDNAs.

(b) Exceeds noise criteria.

TABLE 4.1-12
PREDICTED NOISE LEVEL INCREASES DUE TO PUMP STATION OPERATIONS AT STAMPED PASS

Location	Site	Predicted Noise Level (dBA)- Day				Predicted Noise Level (dBA) - Night				Criteria	
		Measured [a]	Estimated Noise Generated[b]	Predicted Total	Increase	Measured [a]	Estimated Noise Generated[b]	Predicted Total	Increase	Day	Night
West Property Border	1	54	40	54	0	54	40	54	0	60	60
USFS Road 5420 Border	2	50	0	50	0	54	0	54	0	60	60
USFS Road 5400	3	54	0	54	0	50	0	50	0	60	60
Crystal Springs Campground	4	66[c]	0	66[c]	0	61[c]	0	61[c]	0	60	60

(a) The maximum ambient hourly Leq was chosen for each corresponding day or night period.

(b) Estimated noise generated is based on data collected at a similar facility producing 80 dBA, with a transmission loss of 40 dB due to building enclosure. Total dBA was calculated by reducing generated noise levels 6 dBA for every doubling of distance.

(c) Noise levels exceed applicable day/night standards.

Beverly-Burke Station

Noise monitoring was conducted at the proposed Beverly-Burke pump station location. The existing environment is completely desolate with the exception of some agricultural activities and sparse vehicle traffic. The existing noise levels were recorded for the noon-hour only at one location. Figure 4.1-9 presents the monitoring location relative to the proposed source. The monitoring location chosen is considered representative and similar to all possible receptor areas within miles of the proposed location. Noise monitoring was collected facing the Columbia River with the Beverly-Burke Road toward the south of the site. There is literally no receptors for miles in any direction. The predominant noise source was natural sounds from animals, bugs and birds. Occasionally, recorded noise levels reached the minimum range of the monitor. The Leq for the site was calculated as 43 dBA with many readings below 40 dBA. The land-use is zoned Agricultural, or a Class C EDNA. The pump station is not proposed to be enclosed therefore the predicted noise level for the proposed pump station is 80 dBA. The impact of the unenclosed station will be significant, permanently increasing the existing noise level greater than 10 dBA. The permissible noise level required for a Class C EDNA is 70 dBA. Therefore, an exceedance of the standard is also predicted. The distance from the proposed source to meet the noise criteria is calculated as approximately 60 feet. According to the site map for the Beverly-Burke station the noise level can be attenuated within the property boundary of the station if the station is placed at least 60 feet from each border, meeting the permissible noise criteria for a Class C EDNA.

Figure 4.1-9 Beverly-Burke Pump Station Noise Monitoring Sites

Othello Station

Noise monitoring was conducted at two locations within the vicinity of the Othello pump station. The proposed pump station is located within an existing agricultural zoning designation adjacent to an apple orchard and alfalfa cropland. The source and receptors are considered a Class C EDNA. The station is located approximately 1800 yards north of McKinney Road with the nearest residence approximately 2000 yards south of the site. The predominant noise sources in the area consist of agricultural and irrigation equipment, and natural sounds such as birds and bugs. Highway 24 is located at least one mile from the site with occasional vehicle traffic noises contributing to the existing noise levels at the two receptors. Figure 4.1-10 depicts the locations of each receptor and the proposed pump station location. The pump station is not proposed to be enclosed.

Figure 4.1-10 Othello Pump Station Noise Monitoring Sites

Site 1

East property border. Site 1 is located directly adjacent to the apple tree orchard which occupies most of the land east and south toward Highway 24. Noise sources include orchard workers and equipment associated with this agricultural activity. The property border is located approximately 20 feet toward the west.

Site 2

McKinney Road. Site 2 is located approximately 1800 yards south of the proposed station. The nearest residence is estimated 900 yards toward the west. An occasional vehicle pass-by contributes to the existing noise levels as well as irrigation equipment, farm animal noises, high-voltage power lines, and distant traffic from Highway 24.

Figure 4.1-11 and Table 4.1-13 present the existing noise levels recorded at each location. The existing noise levels meet the noise criteria of 70 dBA for Class C EDNAs.

Figure 4.1-11 Othello Station Existing Noise Levels

The predicted impacts of the pump station on each monitoring location are presented in Table 4.1-14. The noise generated by the pump station will not impact the nearest residence due to the attenuation of the noise over a large distance. At site 1, the impact of the station will be significant at the east property border. Impacts will not be predicted at either property border if the pump station is located within 60 feet of the property border. This distance will attenuate the noise level to meet the permissible noise criteria for a Class C EDNA.

TABLE 4.1-13
EXISTING NOISE LEVELS NEAR THE PROPOSED OTHELLO PUMP STATION

Location	Site #	Criteria[(a)]		Measured Sound Level L_{eq} (dBA)			
		Day	Night	6 AM	Noon	Early Evening	Late Evening
East Property Border - Class C EDNA	1	70	70	46	43	40	41
McKinney Road -Class C EDNA	2	70	70	51	42	47	43

(a) Nighttime noise limitations are reduced by 10 decibels during the hours of 10:00 p.m. to 7:00 a.m. for Class A receiving EDNAs.

(b) Exceeds noise criteria.

TABLE 4.1-14
PREDICTED NOISE LEVEL INCREASES DUE TO PUMP STATION OPERATIONS AT OTHELLO

Location	Site	Predicted Noise Level (dBA)- Day				Predicted Noise Level (dBA) - Night				Criteria	
		Measured [a]	Estimated Noise Generated[b]	Predicted Total	Increase	Measured[a]	Estimated Noise Generated[b]	Predicted Total	Increase	Day	Night
East Property Border	1	43	80[c]	80[c]	+37	46	80	80	+34	70	70
McKinney Road 5420 Border	2	47	28	47	0	51	28	51	0	70	70

(a) The maximum ambient hourly Leq was chosen for each corresponding day or night period.

(b) Estimated noise generated is based on data collected at a similar facility producing 80 dBA. Total dBA was calculated by reducing generated noise levels 6 dBA for every doubling of distance.

(c) Noise levels exceed applicable day/night standards.

0.1.1.6 Operation Impacts of the Pipeline

No noise would be associated with the underground pipeline except for noise generated by light-duty vehicles performing periodic inspections.

0.1.1.7 Construction Noise Impacts

Noise standards generally exempt construction noise impacts between the hours of 7 a.m. and 10 p.m. Short-term impacts due to construction are expected along the pipeline route, Kittitas Terminal, and at the pump stations. The primary noise impacts are expected to come from earth-moving equipment. Conventional construction equipment, including bulldozers, graders, scrapers, and heavy-duty trucks and cranes will be employed at these sites. No nighttime construction is anticipated for this project. Some residences will experience unavoidable impacts for a short duration during heavy construction periods.

0.1.1.8 Noise Mitigation Measures

Construction

Mitigation measures during construction operations will include the following:

- Construction will be generally limited to daylight hours.
- All construction equipment shall have sound control devices no less effective than those provided on the original equipment.
- No equipment shall have an unmuffled exhaust system.
- If needed, temporary sound barriers will be used to minimize construction noise if equipment mufflers are not adequate.

Operation

OPL will ensure that noise impacts of the Kittitas Terminal and pump stations remain low. Electrically operated equipment will be utilized at each facility, limiting noise levels substantially.

- OPL proposes to enclose the pump stations that require noise level reductions.
- Ambient noise measurements may be recorded to ensure noise standards will not be exceeded at the pump station locations. If noise levels are found to exceed the standards, appropriate noise reduction methods will be employed.

- At the Kittitas Terminal a simple noise barrier may need to be placed along the west fenceline to mitigate impacts due to the truck loading rack.
- Pump stations will be strategically placed within the property to eliminate noise exceedances at the property border.

0.1.2 RISK OF FIRE OR EXPLOSION

This discussion of the risk of a fire or an explosion is organized in three parts; risk during construction, risk during operation, and mitigation of risk.

0.1.2.1 Risk During Construction

During construction there is a potential for a variety of common construction-related accidents to occur. These would include personal injury, small fuel spills during the fueling of equipment, and damage to other utilities. In some cases, these accidents might include the incidence of a small fire or explosion while refueling equipment. The risks of this type are comparable to those associated with other types of linear facility construction such as building a long stretch of new highway.

Several measures will be used to prevent or lessen the opportunity for occurrence of potential construction-related accidents:

- By contract, the contractors are required to adhere to the attached Exhibit D Contractor Safety Management.
- The contractors will be required to have health and safety plans for working in proximity to hazardous materials and to adhere to recognized practices for safe construction.
- OPL will have on-site health and safety inspectors to ensure that the contractors follow the safety procedures.
- The contractors will be required to establish acceptable fueling procedures for equipment and to provide containment around temporary refueling areas in accordance with federal and state laws. Adherence to these procedures will be ensured by the OPL Environmental Inspector(s).
- OPL will coordinate with all utility providers in advance to identify and locate facilities within the construction zone. The coordination will include conducting a preconstruction meeting and utilizing the one-call ("Call Before You Dig') system.

During installation of the pipeline there will be no refined product in the pipe and thus no potential for product release or fire and explosion. The potential for release, fire and explosion during construction exists from the following sources:

- The use of flammable fuels for construction equipment,
- Installation of the pipeline in proximity to natural gas transmission and distribution pipelines,
- The controlled use of explosives during excavation in limited areas,
- Pipe assembly and testing.

During construction, centralized contractor construction yards will be established for each construction spread (see discussion in Section 2.3.3.2). These yards will be used for marshaling materials, fuel storage, equipment maintenance and equipment dispatch. The presence of equipment fuel (diesel fuel, and gasoline) represent a potential source of fire and explosion. However, these fuels will be stored in approved above ground storage tanks with protective devices and procedures to prevent accidental spills which may lead to a fire or explosion. In addition, site safety procedures will be established for all contractor personnel for the safe handling and operation around stored fuels. Such procedures are common practice in the pipeline construction industry.

During the construction process, fueling trucks will be used to transport fuels from the construction yard to equipment in the field. These fueling trucks will also obtain fuel supplies from commercially available fuel suppliers such as bulk terminal or truck stop operations. It is estimated that approximately 100 fueling operations will occur per day over the 3 pipeline construction spreads during peak construction. Potential for fuel spills during equipment refueling operations will exist. The maximum spill size that could occur would be on the order of no more than 10 gallons and more likely less than 0.5 gallons when they do occur. The primary cause of spill will be overtopping of fuel tanks. Such spills would impact an area no more than 1 meter radius.[1]

Contractors will be required to implement standard precautionary procedures to minimize any fuel spillage. Should spillage occur, contractors will be required to remove any spilled materials and contaminated materials will be remediated. While the storage of fuels does have a remote risk of explosion associated with it, this risk is minimized by the use of properly ventilated tanks and appropriate safety procedures during fueling operations.

The proposed pipeline route will intersect other underground utilities including water, sewer, natural gas

[1] Even a more conservative spill of 50 gallons would generate a surface exposure of approximately 3 meters or 10 feet diameter assuming the spill had an effective thickness of 1 inch. Allowing for average soil permeability conditions this would represent penetration in the range of 0.5 feet. Thus fueling spills of even sizable amounts would not affect a significant area.

and communications systems. The specific location of all utilities has not been determined. However, prior to any construction activities OPL will coordinate with all relevant utility companies to identify and determine the location of their facilities in relation to the proposed construction. In addition the one-call ("Call Before You Dig") system of utility location clearances will also be utilized to cross check and verify utility locations. Extra precaution will be taken during construction in the vicinity of buried utilities.

Natural gas pipelines are the only utility facilities that represent a potential for fire or explosion[2]. During selection of the pipeline route it was determined that the proposed project will cross Northwest Pipeline natural gas transmission line facilities at two locations; one at a location north of the Vantage Highway, east of Ellensburg and a second location in Snohomish County. In the case of the Northwest Pipeline facilities, the proposed product pipeline will be installed underneath the gas pipeline. During this phase of construction, great care will be taken during excavation of the pipeline trench given the presence of the large diameter natural gas pipeline. Construction techniques will be implemented to ensure protection of the gas pipeline to eliminate the possibility of accidental release of natural gas.

Should a small diameter natural gas distribution line be damaged during construction, the immediate area would be immediately evacuated and emergency procedures as required by the gas utility implemented. If windy conditions are present, it is likely that the gas release would dilute in the atmosphere below an explosive threshold and the risk of fire or explosion risk would be minimal. In still wind conditions, depending of the nature and extent of the damage, fire and explosion potential would be present. Mitigation would include evacuation of construction personal, clamping or closing the line to eliminate the release and repair of the pipeline.

At several locations along the pipeline route, near surface bedrock conditions will require the limited use of explosives for excavation of the pipeline trench. These situations are not considered accidental explosions within the meaning of WAC 463-42-352. Nevertheless such situations are potential hazardous and strict construction and construction safety procedures will be applied to eliminate any risk to workers. Specific construction procedures will be implement to control blasting debris.

Finally there is the potential for fire resulting from pipeline assembly. During construction, pipe sections will be aligned, welded together and x-rayed. During this process welding and grinding activities have the potential for ignition of flammable materials. However, all construction will take place in areas cleared of vegetation. As part of the construction procedure, portable fire suppression equipment will be present at all welding and grinding sites and construction personnel trained in their use and application will be present. With implementation of these safety procedures and assembly of the pipeline in a cleared area, the risk of fires from pipeline construction are considered to be very low.

[2] Other than crossings of Northwest Pipeline facilities, there are no known product pipelines in the vicinity of the proposed project or any other known facility containing flammable or hazardous materials.

0.1.2.2 Risk During Operation

In the Cross Cascade Pipeline Project/Product Spill Analysis (Dames & Moore, 1997), the probability that a spill or release from the pipeline during operation at any specific location was determined to be extremely unlikely. However the products to be transported by the pipeline are by nature flammable liquids and are potentially subject to fire and explosion. A mere release will not by itself generate a fire or explosion; some causal factor must also be present. The following discussion includes the presence of causal factors and the potential impacts should a fire or explosion event occur.

During operation of the pipeline, accidental releases of refined petroleum products and attendant risk of fire and explosion could occur as follows:

- Accidental releases (spills) from project facilities including the pipeline, valve locations, pump stations and the Kittitas Terminal,
- Fire and explosion risk as the result of accidental release,
- Health effects of product vapors from accidental releases.

The potential probability of product releases or spills from the pipeline has been discussed in detail in Cross Cascade Pipeline Project/Product Spill Analysis. This report shows that the probability of a pipeline spill is extremely unlikely at any specific point along the route and spills in general will have a low probability of occurrence. This report also discusses a number of spill scenarios and includes an environmental consequence analysis. In that report, representative spill volumes are calculated in relation to the type and location of the various spill scenarios. Included among the spill scenarios are tanker truck and barge transportation scenarios.

Block valves are one of the sources of historical leaks on the existing OPL pipeline system. Instrument connections at buried block valves have been a particular problem. As a result of this experience, block valves are proposed to be located above-ground wherever possible to allow for visual inspection, and will be located on impermeable pads. Similarly, the pump stations, which will also include valving and other miscellaneous equipment, will have vapor detectors and alarm system to protect against fire and fire damage to equipment.

Tanker trucks operating from the Kittitas terminal and terminal facilities in Pasco are not part of the proposed project and thus not evaluated as part of the fire and explosion risk posed by the project. However, the Spill Analysis Report demonstrates that the number of long-haul tanker truck trips from Western Washington to product markets in Eastern Washington would be significantly reduced[3]. Thus the

[3]The Spill Analysis Report shows that approximately 4 - 6 tanker truck spills would occur per year with continued shipments of refined products to Eastern Washington. The proposed pipeline would provide a substitute transportation mode eliminating these trips and the associated predicted spills.

overall risk of fire and explosion from tanker truck operations will be reduced by construction of the proposed project.

Accidental spills during truck loading operations at the Kittitas Terminal are expected to be minimal. Hard connections between the loading rack and tanker truck will used to eliminate spills and control displaced vapors during filling operations. The loading rack will consist of a hard surface with appropriate drainage and containment which will facilitate the cleanup of any material accidentally spilled. In addition, safety procedures to eliminate a source of combustion will be observed during tanker truck loading operations.

Storage tanks at the Kittitas terminal will be within a diked containment structure. The containment will be capable of holding 110% of the volume of the largest tank. The largest tank anticipated for the Kittitas Terminal would have a volume of 115,000 barrels. It should be noted that the area within the containment is designed to be impervious and would therefore protect the natural environment. All other spills or accidental releases except for those discussed the Spill Analysis Report are expected to be of minimal impact.

In the unlikely event of a tank failure and a potential subsequent fire, significant thermal radiation (heat) will be generated. In certain circumstances this heat can be life threatening and have a significant impact on adjacent facilities and equipment. If a spill event along the pipeline were to be ignited, the resultant thermal radiant energy could have significant consequences. Such fires have the potential for harm to humans and burning of adjacent areas which could include sensitive habitats and resources.

The level of heat energy can be estimated and is primarily affected by three factors, the material that has been ignited, the size of the spill area (referred to as the pool size) and the ambient wind condition. To assess fire impacts, various size pool fire were analyzed. Spills of 300 barrels to 3,900 barrels and several intermediate size spills were analyzed. In each case it was assumed that the burning material was gasoline which burns with the greatest intensity. In addition two different meteorological conditions were analyzed still conditions and windy conditions. Table 4.1-15 shows the input parameters and the calculated distances from the source to attain three levels heat intensity to quantify relative exposure. Table 4.1-16 shows the observed effects of thermal radiation.

TABLE 4.1-15
THERMAL RADIATION LEVEL SCENARIO ANALYSIS

Spill Size BBL	Wind Speed (m/s)	Pool Radius (m)	Flame Height (m)	Flame Tilt from Vertical (deg)	Distance to Specified Thermal Radiation Levels (m)		
					5 (kW/m^2)	10 (kW/m^2)	12.5 (kW/m^2)
300	1	14	32.5	0	45	22	17
	10	14	22.5	69.5	91	57	46
500	1	18	38.5	0	50	26	21
	10	18	27.0	68.6	107	64	48
2000	1	37	62.2	0	92	48	44
	10	37	46.0	65.8	201	119	91
3900	1	51	77.0	0	134	79	71
	10	51	58.1	64.3	281	161	116
Terminal[4]	1	21	43.0	0	57	32	29
	10	21	30.3	68.0	122	71	58

TABLE 4.1-16
OBSERVED EFFECTS OF THERMAL RADIATION INTENSITY

Thermal Radiation Intensity (kW/m^2)	Observed Effect
37.5	Sufficient to cause damage to pump station equipment
25.0	Minimum energy required to ignite wood at indefinitely long exposures (nonpiloted)
12.5	Minimum energy required for piloted ignition of wood, melting of plastic tubing
9.5	Pain threshold reached after 6 seconds; second degree burns after 20 seconds
4.0	Sufficient to cause pain to personnel if unable to reach cover within 20 seconds; however, blistering of the skin (second degree burns) is likely; 0% lethality
1.6	Will cause no discomfort for long exposure

Source: Center for Chemical Process Safety (CCPS), 1989

[4] Represents a pool fire within the containment of the largest storage tank at the Kittitas Terminal. Area of pool fire was calculated as the total areas of the containment minus the cross-sectional area of the storage tank.

Review of the calculated heat intensities generated by the pool fires given in the scenarios shows that most have the potential for generating secondary combustion of any nearby wood structures and vegetation and have the potential to cause serious injury to personnel who cannot retreat from the fire in a relatively short time period. At the terminal facility, a significant heat impact would exist as a results of a fire to personnel and facilities. However, calculations show that damaging heat effects would be limited to the boundaries of the terminal property. The potential impacts of a product fire emanating from a relatively small spill pool can have demonstrated significant effects. However the probability of a spill has been determined to be small. The probability that a spill will occur and a fire with damaging effects will also occur is equally small or smaller. Thus risk of fire as an impact of the project is not significant.

An accidental explosion within a system along the pipeline route is possible, but highly unlikely. During Olympic Pipe Line Company's operating history, only two explosions have occurred. Both of the incidents occurred at pump stations during shutdown cycles and neither were the result of a spill.

An explosion is defined as a sudden release of energy produced by a chemical reaction. For an explosion to occur within a system along the pipeline route, a mixture fuel and air must be present in an appropriate ratio and an ignition source available to cause the mixture to detonate. Airblast and ground vibration are the destructive effects that result from an explosion and can create an impact on a surrounding population and nearby property (e.g., buildings). Airblast phenomena resulting from an explosion is the rise in pressure above atmospheric (overpressure) due to the detonation. The amplitude of the resulting overpressure can be recorded by a transducer and measured in decibels or pounds per square inch. If the explosion occurs on or near the ground surface, energy from the detonation is deposited in the ground causing the ground to vibrate. Ground vibration can be measured by a seismograph and reported in terms of velocity (inches per second). High ground vibration or motion creates resulting forces similar to earthquake effects that can damage structures. Even moderate and low levels of ground vibrations can be irritating to a surrounding population and may result in legal claims of damage and nuisance. Tables 4.1-17 and 4.1-18 list threshold values for explosive effects from airblast and ground vibration, respectively.

TABLE 4.1-17
THRESHOLD AIRBLAST EFFECTS

EFFECT	OVERPRESSURE (PSI)
Lethal	11 - 15
Serious injury due to blast, fragments, and debris. Unstrengthened building damage near total destruction	8.0
Near complete destruction of houses	5.0 - 7.0
Lung damage	4.4 - 5.1
Unstrengthened buildings damage serious and destruction requiring about 50% or more of replacement cost to repair	3.5
Collapse of steel panel buildings and rupture of chemical storage tanks	3.0 - 4.0
Eardrum rupture	2 - 3
Unstrengthened buildings damage serious and destruction requiring about 5% or more of replacement cost to repair	1.2
Minor damage to houses	0.7
Glass windows shatter	0.5

Source: Baker, W. E., P.A. Cox, P.S. Westin, J.J. Kulesz, and R.A.Strehlow, 1983. Explosion Hazards Analysis and Evaluation, Elsevier Scientific Publishing Company

TABLE 4.1-18
THRESHOLD GROUND VIBRATION

Effect	Velocity (in/sec)
Can be Felt	0.035
Barely Detectable	0.10
Detectable	0.20
Definitely Detectable	0.40
Disturbing	0.60
Unpleasant	1
Very Unpleasant	2
Insufferable	4
Unbearable	6

Source: Merritt, F.S. (Ed). 1983. Standard Handbook for Civil Engineers, 3rd Edition, McGraw Hill, New York.

To assess potential impacts from an explosion at the Kittitas Terminal, an analysis was conducted that hypothesized an accident scenario where the largest storage tank exploded. The diameter and height of the largest tank are 150 feet and 48 feet, respectively. Gasoline was assumed to be the petroleum product

being stored. The analysis assumed that gasoline vapors mixed with air forming a uniform mixture that accumulated in a near empty tank at ambient conditions. An ignition source was assumed to be present, but a specific ignition source was not identified for the analysis. For the analysis, the weight of TNT equivalent to the energy content of the fuel-air mixture was computed. The equivalent weight was based on the mass of gasoline vapor (5300 pounds) in the tank and an energy ratio of 2.92 between gasoline and TNT, yielding 15,500 pounds of TNT[5]. This equivalent mass of TNT was used to compute overpressures and ground velocity as a function of range from the tank assumed to explode in the hypothesized accident scenario. Calculations were based on surface burst procedures and assumed that the tank shell had insufficient strength to affect the explosive effects. Figure 4.1-12 shows the resulting peak overpressure from the airblast and peak velocity in the ground as a function of range from the approximate location of the largest storage tank at the Kittitas terminal.

[5] Southwest Research Institute, *Letter report to Dames & Moore*, San Antonio, Texas, May 22, 1997.

Figure 4.1-12 - Range to Blast Effect - Kittitas Terminal

The analysis for this scenario and set of parameters selected shows that severe damage from airblast overpressure and ground vibrations to other storage tanks, equipment and personnel on the terminal property can be expected. Following general practice guidelines, which set a peak velocity in the ground of 2 inches per second as a criteria for structural safety against damage, no structural damage is predicted to occur from ground vibrations to currently existing structures nearby the terminal property[6]. Potential minor structural damage and breakage of glass windows from airblast overpressure can be expected at a range of 1500 feet from the exploding tank to the limits of the predictive calculations, respectively.

Although this analysis shows that potential impacts from a tank explosion can range from severe to minor, the probability that a tank explosion will occur is small. Construction of the storage tanks will follow API recommendations that include venting near the top of the tanks to prevent an accumulation of fuel-air vapors that are required for an explosion to occur. In addition, a floating cover within the fixed roof tank contains a seal to minimize vapors from escaping into the open space above the floating cover and the fixed roof. Limitations on the availability of an ignition source to detonate an accumulated fuel-air mixture should one develop further reduce the probability of an explosion occurring. Therefore, the risk of an explosion as an impact of the project is not significant.

0.1.2.3 Mitigation of Risk

- The risk of an explosion at the storage facility will be mitigated by designing, constructing, and operating the facility as required in the latest versions of the applicable codes, regulations, and consensus standards.
- Construction of the storage tanks will follow API recommendations that include venting near the top of the tanks to prevent an accumulation of fuel-air vapors that are required for an explosion to occur.
- An internal floating roof within the fixed roof tank contains a seal to minimize vapors from escaping into the open space above the floating cover and the fixed roof.
- The availability of an ignition source to detonate an accumulated fuel-air mixture will be limited to further reduce the probability of an explosion occurring.
- The facility will be operated by qualified personnel using written procedures. Procedures will provide clear instructions for safely conducting activities involved in all operations of the distribution facility including emergency situations.
- Before being involved in operating the distribution facility, employees will be presented with a facility operations plan, and will receive training regarding the operating procedures and other requirements of safe operation of the facility. In addition, employees will receive annual refresher training, which will include testing of their understanding of the

[6] Wish J. F., 1968. *Effects of Blasting Vibrations on Buildings and People*, Civil Engineering, July, pp. 46-48.

procedures. Training and testing records will be maintained.

- A hazardous materials emergency response program will be implemented for the facility. See Section 2.9 Spill Prevention and Control, and Section 7.2 Emergency Plans.
- The pipeline location will be clearly marked at fencelines and road crossings to minimize risk of third-party damage.

0.1.3 RELEASES OR POTENTIAL RELEASES TO THE ENVIRONMENT

0.1.3.1 Hazardous Materials Used During Construction

Hazardous materials which could generate solid or hazardous wastes during construction could include diesel fuel and gasoline, lubricants, cleaning solvents, and paint and paint residues. Other solid wastes associated with construction activities could include empty containers, scrap wood, scrap metal, and trash. Solid and hazardous wastes which would likely be generated during operation could include used oil, spent antifreeze, spent cleaning solvents, paint residues, unused adhesives, discarded water treatment chemicals and residuals, spent lead acid batteries, packing materials, scrap metal, trash, and garbage.

0.1.3.2 Hazardous Materials Used During Operation

The types of chemicals and hazardous materials to be used and stored at the facility are listed in Appendix C. No asbestos or PCB materials will be used in the construction or operation of the facility.

Potential health effects could arise from the accidental release of refined petroleum products by exposure to volatilized compounds. Diesel fuel and Jet A (kerosene) are less volatile than gasoline and therefor have less potential for toxic impacts. The specific compounds in gasoline that are potentially toxic are given in Table 4.1-19. Table 4.1-19 shows the compound content by percent of volume in both the liquid and vapor stages with Alkanes/Napthenes being the largest constituent of the vapor phase.

TABLE 4.1-19
COMPOSITION OF GASOLINE

	Liquid Phase (range)	Vapor Phase (approx. concentration)
Hydrocarbon class		
Alkanes/naphthenes	30-90%	90%
Aromatics	10-50%	2%
Alkenes	6-9%	9%
Additives		
1975 Organolead	±39/gallon	<0.004%**
Ethylene dichloride (EDC)	150-300 ppm	0.15 ppm
Ethylene dibromide (EDB)	80-150 ppm	0.08 ppm
1989 Organolead	<0.05 g/gallon	0.004%**
(EDC and EDB not used)		
Methyl tertiarybutyl ether	10%	6%

*By volume (except organolead)
**Undetectable

Source: Weaver, Neil K. M.D. 1991. Hazardous Materials Toxicology,Chapter 73, Williams & Wilkins Publishers.

Should an accidental release of product (gasoline) occur, a portion of the spilled product will vaporize. Human exposure to these vapors may have potential health impacts. Table 4.1-20 describes the health impacts that could occur at various concentration levels. Spills in unconfined spaces will volatilize, but in relatively low concentrations. Exposure is immediately apparent by smell and even at higher concentration levels the time period is sufficiently long to allow for retreat from an exposed area. In addition, as part of the spill response process, areas of harmful vapor concentrations are typically evacuated and access limited to properly protected individuals.

Analysis of specific downwind concentrations of toxic vapors from an accidental release depends significantly on site characteristics, meteorological conditions, rate of release and surface area of the resulting product pool. Atmospheric dilution of volatilized compounds is expected to occur at a rate that toxic effects would not occur outside of the area immediately surrounding the spill site.

An accidental release of refined product that does burn produces combustion by-products including carbon, carbon monoxide and water vapor. Heat generated by the fire will form a localized unstable atmosphere (rising air) carrying combustion byproducts to higher altitudes where additional atmospheric mixing (dilution) will occur. Some fallout of carbon in the form of ash is possible, but is not toxic. Thus no

potential health effects in areas downwind of a product fire are expected as a result of the fire itself. Combustion of other materials that may also burn as a result of the product fire may include some toxic compounds. However, it is expected that these compounds would also experience atmospheric dilution at altitude and not represent a toxic health impact.

TABLE 4.1-20
HUMAN EXPERIENCE: EXPOSURE TO GASOLINE VAPORS

Concentration ppm	Exposure Time	Effect
5,000 - 16,000	5 minutes	Lethal
10,000	4 minutes	Dizziness
10,000	10 minutes	Intoxication
3,000	15 minutes	Dizziness
1,000	1 hour	Dizziness, headache, nausea
1,000	30 minutes	Eye irritation only
500	1 hour	Eye irritation
160-270	8 hours	Eye irritation

Source: Weaver, Neil K. M.D. 1991. Hazardous Materials Toxicology, Chapter 73, Williams & Wilkins Publishers.

0.1.3.3 Handling, Storage, and Disposal of Hazardous Materials

Handling, storage, and disposal of toxic and hazardous materials used in construction and operation of the project will be in accordance with applicable state and federal regulations as described below and will not result in a threat to public health and safety. Only minor amounts of hazardous wastes will be generated by the facility, primarily small quantities of materials such as used paints, thinners, and solvents.

- Hazardous Waste Management - Waste regulations (WAC 173-303) - Any dangerous wastes generated by the facility will be managed to ensure compliance with the Washington Dangerous Waste Regulation (WAC 173-303). The dangerous wastes will be limited to solvents and paint wastes generated during maintenance activities. A generator identification number has not been assigned.
- Hazardous Substances - Title III of the Superfund Amendments and Reauthorization Act (SARA Title III) and the Occupational Safety and Health Administration's Hazard Communication Standard mandate communication of information to local agencies to assist in their response to emergency situations. Material Safety Data Sheets (MSDS), which provide specified information on each toxic or hazardous material stored and used on site, will be maintained on file. The MSDS describe the potential health effects of each

substance under different types of exposure and appropriate safety and treatment measures. A listing of hazardous materials will be provided to local Tier 3 emergency response agencies.

- Hazardous Substance Release - If, during the operation of the facility, any substance listed in 40 CFR 302 is released to the environment, OPL will notify EFSEC, the National Response Center, U.S. EPA, the Washington Utilities and Transportation Council (WUTC), the Washington Department of Emergency Services, and the Washington Department of Ecology as required under Section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Response to any accidental release will be guided by the Spill Prevention, Control, and Countermeasure Plan (as described in Section 2.9 Spill Prevention and Control of this application) and any additional measures required by EFSEC or Ecology. In addition, the state *Dangerous Waste Regulations* (WAC 173-303) implement the federal Resource Conservation and Recovery Act (RCRA) in Washington State. Waste management procedures in accordance with the state regulations will be followed for the facility.

0.1.4 SAFETY STANDARDS COMPLIANCE

OPL and its subcontractors will be required to comply with applicable local, state, and federal safety, health, and environmental regulations. The following are some of the primary standards that will be used in the design, construction, and operation of the pipeline and facilities.

- 49 CFR Subchapter D - Parts 190, 194, 195 and 199.
- National and State Electrical Codes.
- OSHA (WISHA), 29 CFR 1910.95 and 1926.52 (Occupational Noise Exposure).
- Uniform Building and Fire Codes.
- American National Standards.
- Chapter 173 of the Washington State Department of Ecology Noise Regulations and WAC 296-62-09015-296-62-09055, Part K.

0.1.5 RADIATION LEVELS

The proposed project is not expected to use or release any radioactive materials during operation. During construction, there will be a minor, controlled use of radiation. This will consist of radiographic inspection of pipeline welds and some facility welds.

Radiation from pipeline radiography is emitted at a very low level and is contained within and restricted to the immediate area of the weld being examined. Almost all of the welds will be radiographed from *inside* the pipeline. The few welds that will be radiographed from the outside (tie-in welds and repairs) will use a projector which narrowly collimates the radiation and directs it only at the weld area. Trained

radiographers will monitor the level of exposure in the immediate environment and will cordon off the area so that all personnel are kept at a safe distance and are not exposed. Absolutely no unattended radiography will be conducted. Pipeline radiography and radiation safety are both regulated by the State of Washington.

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